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TWO NEW LYGOSOMINE SKINKS FROM NEW GUINEA WITH COMMENTS ON THE LOSS OF THE EXTERNAL EAR IN LYGOSOMINES AND OBSERVATIONS ON PREVIOUSLY DESCRIBED SPECIES

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Abstract. Two new species of the *fasciatus* species group of *Sphenomorphus* are described from New Guinea: *S. anotus* is unique among its relatives in lacking an external ear opening and *S. microtympanus* can be distinguished by the greatly reduced size of its tympanum.

The earless lygosomines are reviewed and it is noted that, while the loss of the external ear opening is apparently a prerequisite for a burrowing way of life, it is uncertain whether the loss of the external ear in burrowers is a primary adaptation to burrowing or whether it is a preadaptation inherited from a nonburrowing ancestor.

Certain aspects of the morphology of the previously described but poorly known species *Sphenomorphus forbesi*, *S. oligolepis* and *S. schultzei* are discussed and photographs of type specimens are provided.

In 1964 members of the Seventh Archbold Expedition collected two small scincid lizards on the Huon Peninsula which differed from all other known skinks in New Guinea in having a scaly auricular depression instead of the more external ear opening. These were thus the first "earless" skinks to come out of New Guinea. The specimens were sent to Dr. Richard Zweifel at the American Museum of Natural History, but he was unable to identify them and he put them aside in the hope that more specimens would be forthcoming.

Five years later two more very similar skinks were collected by Angus F. Hutton at Garaina and given to Dr. Zweifel during his 1969 trip to New Guinea. Dr. Zweifel recognized the great similarity between these two specimens and the Huon Peninsula specimens but, still being unable to identify them, he kindly turned them over to me for further study.

On close examination the two specimens from the Huon Peninsula prove to be members of the *fasciatus* species group of *Sphenomorphus* (Greer and Parker, 1967), but they differ strikingly from all known members of this species group in being "earless." The two Garaina specimens are also clearly members of the *fasciatus* species group and are indeed similar to the Huon Peninsula specimens. They differ from the Huon Peninsula specimens, however, in having a relatively small, but nonetheless distinct, tympanum instead of a scaly auricular depression, and they differ from all previously described members of the *fasciatus* species group in the extreme reduction in the size of the tympanum. The Huon Peninsula and Garaina specimens are thus distinct enough from each other and from their closest relatives in the *fasciatus* species group to be described as new.

Description of Two New Species

Sphenomorphus anotus new species

Figure 1

Holotype. American Museum of Natural History 95880; an adult collected on 5 May 1964 by Hobart M. Van Deusen and Stanley O. Grierson in the Morobe District of the Territory of New Guinea at MASBA CREEK (Figure 4) at an elevation of approximately 2000 feet. For an account of this locality see Van Deusen (1966).

Paratype. AMNH 95881; a badly mangled young juvenile collected by Van Deusen and Grierson on 7 May 1964 at the same locality as the holotype.

Diagnosis. This species is a typical representative of the *fasciatus* species group of *Sphenomorphus*[1] (Greer and Parker, 1967) except that it has a scaly auricular depression instead of the more usual external ear opening. In other words, it is the only "earless" member of the *fasciatus* species group known to date.

Etymology. The species name *anotus* calls attention to the absence of an external ear (*an* — without and *otus* — ear).

[1]The diagnostic features of the *fasciatus* species group of *Sphenomorphus* are as follows: digits and limbs usually well developed but the limbs generally not overlapping when adpressed to the body; frontal in contact with the two anteriormost supraoculars; generally four supraoculars; a single anterior loreal; no supranasals; usually a series of two or more paired nuchal scales; generally 36 or fewer scales around midbody, the scales of the paravetebral rows being larger than the scales of the more lateral rows; generally a postorbital bone that is usually long and thin.

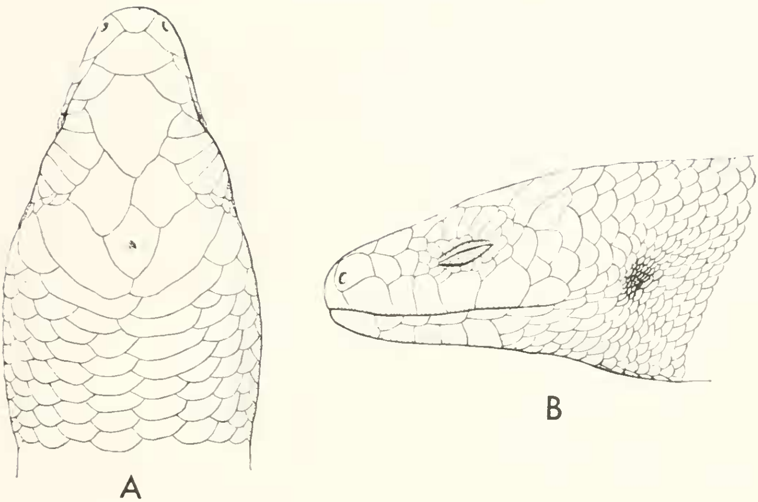

Figure 1. Dorsal (A) and lateral (B) view of the head of the holotype of *Sphenomorphus anotus* (AMNH 95880) from Masba Creek, Huon Peninsula, New Guinea.

Description of the holotype. A small attenuate skink measuring 48 mm in snout–vent length with a complete tail measuring 68 mm in length; head bluntly conical; limbs short, pentadactyl, widely separated when pressed against the body; uniformly brown above and light yellowish brown below (in preservative).

Rostral about as deep as wide and projecting well onto dorsal surface of snout; nasal large with external naris situated well forward and ventral in nasal scale; no supranasals; frontonasal wider than long and forming a short suture with rostral and a slightly wider suture with frontal; prefrontals separated; single anterior and posterior loreals; frontal slightly longer than wide and in contact with two anteriormost of four supraoculars; lower eyelid movable and scaly; frontoparietals and interparietal distinct, approximately subequal in size, and measured together along midline, about equal in length to frontal measured along midline; parietals meet behind interparietal; two nuchal scales on left side and four on right; six supralabials, fourth situated most directly below eye (Fig. 1).

External ear opening lacking and in its place an auricular depression completely lined with small scales; body scales smooth and in 26 longitudinal rows at midbody; scales of paravertebral scale rows slightly wider than other dorsal scales at midbody and numbering 71–72 in distance from parietals to midpoint of insertion of hind legs; medial pair of preanal scales enlarged; medial row of scales on underside of tail only slightly larger than adjacent lateral rows; 8–9 obtusely keeled lamellae beneath fourth toe; fourth toe covered dorsally by a single row of scales on distal third of length, by two rows of scales over medial third, and by three rows over proximal third (Group III of Brongersma, 1942).

Color of the holotype. No color notes were made on the specimen in life. In preservative, however, the dorsum is a uniform light chocolate brown while the venter is a light yellowish brown anterior to the vent and a slightly darker brown posterior to the vent. There is no sharp transition line between the dark dorsal color and the light ventral color. There is only the slightest trace of scattered dark spotting on the throat.

Variation in the paratype. The single paratype of *Sphenomorphus anotus* is a small (snout–vent length = 24 mm), badly mangled specimen obviously of very young age. In the characters that can be evaluated it differs but little from the holotype: there are 26 midbody scale rows, the fourth supraocular lies most directly beneath the eye, there are 3–4 nuchals, and most importantly, there is a scale-lined auricular depression instead of an external ear opening. In color the paratype is similar to the holotype but it lacks the yellowish wash to the venter.

Distribution. Sphenomorphus anotus is known only from the type locality on the Huon Peninsula of New Guinea (Fig. 4).

Habitat. The Masba Creek locality where the two types were caught is in a "stretch of unbroken rain forest" (Van Deusen, 1966) and both animals were taken as the litter was being scraped level for the tents and work flys. Thus it would seem that, like other members of its species group, *S. anotus* is a cryptic burrower in the litter.

Relationships. S. anotus appears to be very closly related to the following species, but a discussion of the relationships of both forms is deferred to the end of that species' description.

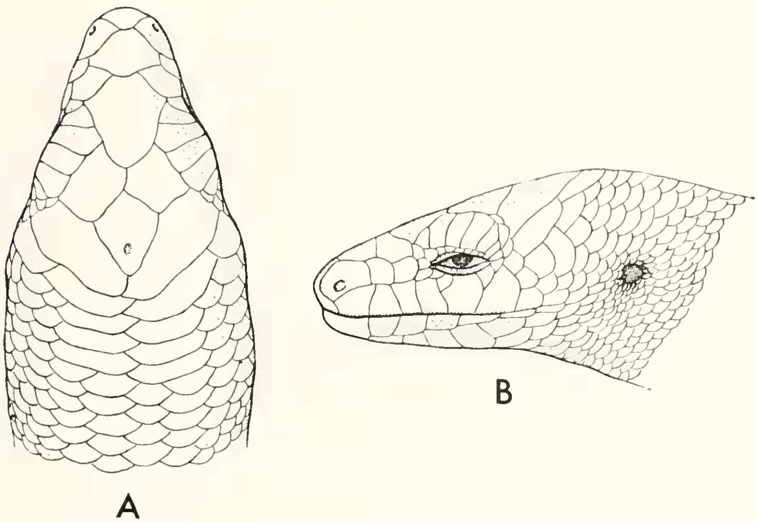

Figure 2. Dorsal (A) and lateral (B) view of the head of the paratype of *Sphenomorphus microtympanus* (MCZ 132767) from Garaina, New Guinea.

Sphenomorphus microtympanus new species
Figures 2, 3, and 5 (top)

Holotype. AMNH 104076; an adult collected on 7 July 1969 by Angus F. Hutton in the Morobe District of the Territory of New Guinea at GARAINA (Fig. 4) at an elevation of approximately 2300 feet.

Paratype. MCZ 132767; same data as the holotype.

Diagnosis. S. microtympanus is a member of the *fasciatus* species group of *Sphenomorphus* and in that it lacks an ectopterygoid process to the palatine running along the outer edge of the palatal ramus of the pterygoid it is most similar to the *fasciatus* subgroup of that species group (Greer and Parker, 1967). It differs from all members of its species group, however, in having the tympanum both much reduced in size and decidedly more opaque (thickened?).

Etymology. The name *microtympanus* calls attention to the relatively small size of the tympanic membrane of the species.

Description. Since *S. microtympanus* is so similar to *S. anotus* just described, I will only give specific counts and mea-

surements for *S. microtympanus* and will describe only those aspects of the species' morphology in which it differs noticeably from *S. anotus*.

Both the holotype and paratype have a snout-vent length of 45 mm; in the paratype the tail is broken but in the type it is complete and measures 60 mm. Both specimens of *S. microtympanus* are a richer chocolate brown above than *S. anotus* and in preservative both lack the yellowish wash on the undersides shown by the holotype of *S. anotus*. These color differences may, however, be an artifact of preservation.

There is a scaly auricular depression very similar to the auricular depression of *S. anotus,* but at the bottom of the depression there is a small, opaque tympanum instead of scales as in *S. anotus* (Fig. 2).

Both type specimens of *S. microtympanus* have four pairs of nuchal scales, and, in three out of the four cases, there are six supralabials with the fourth situated most directly below the eye; on the right side of the head in the paratype there are seven supralabials and the fifth is under the eye. There are 26 scale rows at midbody and the scales of the two mid-dorsal rows number 75 in the paratype and 71 in the holotype when counted from the parietals to the midpoint of the insertion of the hind legs. The subdigital lamellae on the fourth toe number 8–10.

Color. In addition to being richer brown above and lacking the yellowish wash below, the type and paratype of *S. microtympanus* differ from *S. anotus* in having a very noticeable brown wash on the throat and chest instead of a very faint brown wash limited to the throat as in the type of *S. anotus*. This wash is much more pronounced in the paratype of *S. microtympanus* than in the holotype.

Distribution. S. microtympanus is known at present only from the type locality (Fig. 4).

Habitat. According to Dr. Zweifel (letter, 14 February 1973), the "undisturbed habitat around Garaina is rain forest on river terrace and foothills."

Figure 3. The holotype of *Sphenomorphus microtympanus* (AMNH 104076) from Garaina, New Guinea. The specimen has a snout-vent length of 45 mm and a tail length of 60 mm.

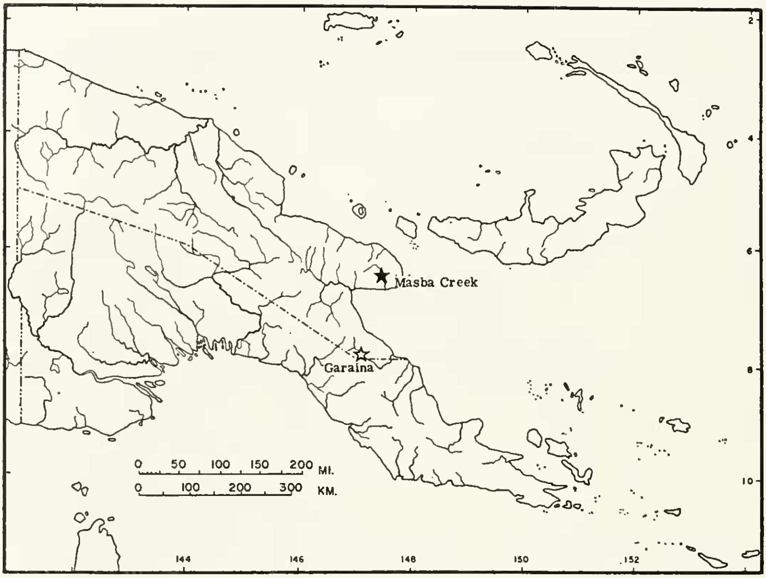

Figure 4. Map of eastern New Guinea showing the type localities of *Sphenomorphus anotus* (Masba Creek = closed star) and of *S. microtympanus* (Garaina = open star). The two species are known only from their type localities.

Relationships between S. microtympanus and S. anotus. These two species are so similar in all aspects of their external morphology, save for the nature of the external ear, that they are almost certainly each other's closest known living relatives. Indeed, it looks as if *S. anotus* could have easily evolved from a *microtympanus*-like ancestor simply by having the scales on the sides of the auricular depression extend down and over the very small tympanum at the bottom of the depression.

The relationship between these two taxa appears to be so close that I originally thought it might be possible to describe them as the same species. To do so would have required only that one believe that the variation shown in the external ears of the specimens exists within a single species. But this kind of variation is unknown in better studied skink species (*e.g.*, the skinks of the earless genus *Hemiergis* or the many species of *Lerista*, which have minute ear openings), and to conclude

that it exists within or between the populations represented by these four specimens seems presumptuous.[1]

Relationships with other skinks. Within the *fasciatus* species group of *Sphenomorphus* there are only four other previously described species that are like *microtympanus* and *anotus* in possessing the following suite of characters: relatively small size (maximum snout–vent length 55 mm or less); more or less uniformly dark dorsal color; a moderate number of midbody scales (overall range, 20–28; range of modes, 24–26), and a low number of subdigital lamellae on the fourth toe (upper limit of range not exceeding 16). All four species occur in New Guinea and in the order discussed below they are *forbesi*, *schultzei*, *beauforti*, and *oligolepis*. Comparative data for these four species plus *microtympanus* and *anotus* are presented in Table 1.

Forbesi. On the basis of palatal morphology, *forbesi* seems quite distant from *microtympanus* and presumably also *anotus*, although I was not able to examine the palate of this last species. In *forbesi* there is an ectopterygoid process to the palatine which excludes the palatal ramus of the pterygoid from a position on the infraorbital vacuity. In *microtympanus* and presumably also in *anotus* there is no ectopterygoid process and the palatal ramus of the pterygoid enters the infraorbital vacuity. The presence or absence of the ectopterygoid process may reflect a basic evolutionary dichotomy in the *fasciatus* species group (*solomonis* subgroup vs. the *fasciatus* subgroup — *fide* Greer and Parker, 1967) and on this basis alone I would exclude

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[1]There is one poorly analyzed precedent for including skinks both with and without an external opening in the same species. Fuhn (1969) has treated the earless *Ablepharus grayanus* as a subspecies of *A. pannonicus*, a species with a minute external ear opening. His hard-core evidence for this taxonomic move is apparently contained in the following sentence: "Mertens (1964, in litt.) records also specimens of Afghan *A. pannonicus* populations with no ear openings (coll. Dr. K. Lindberg)." But Mertens' (1965) published evidence is nothing more than a brief description and much discussion of one specimen (the only one from that locality) which he said looked like *pannonicus* but which lacked an external ear opening, the key character of *grayanus*. Fuhn himself examined a total of only six specimens of both specimens (three *pannonicus* from one locality and three *grayanus* each from a different locality), none of which he reports as being unusual with regard to the external ear. Perhaps more evidence exists in Mertens' *in litt.* communication, but until that is forthcoming, the case for intraspecific variation in the presence or absence of an external ear in skinks is, at best, on shaky ground

TABLE 1. Morphological data for *Sphenomorphus anotus* and *S. microtympanus* and the four species of the *fasciatus* species group of *Sphenomorphus* most similar to them in size, color and scale counts.

Species	Midbody scale rows (modal number in parenthesis)	Subdigital lamellae on fourth toe	Maximum known snout-vent length (mm)	Subocular supralabial	Prefrontals meet medially
anotus	26	8 – 9	48	4th	No
microtympanus	26	8 – 10	45	4th	No
oligolepis	24 – 28 (26)	9 – 12	55	4th (17%) or 5th (83%)	No, rarely yes
forbesi	21 – 26 (26)	10 – 12	44	4th	No
schultzei	20 – 26 (21)	8 – 13	39	4th	Yes, rarely no
beauforti	26	12	46	4th	Yes

forbesi from close relationship with *microtympanus* and *anotus*.

Schultzei. The palate of *schultzei* is similar to that of *microtympanus* in that it lacks an ectopterygoid process, but other features of its morphology cause me to exclude it from the close relatives of *microtympanus* and *anotus*. The most notable of these features is the unique fusion of the first supralabial and nasal scales (see below), the medially meeting prefrontals (in most specimens), and the proportionately longer legs.

Beauforti. As far as I can tell, *beauforti* is known only from the type specimen (de Jong, 1927) and I have not seen this specimen. I feel, however, that the absence of nuchal scales and the medially meeting prefrontals are enough to make *beauforti* an unlikely near relative of *microtympanus* and *anotus*.

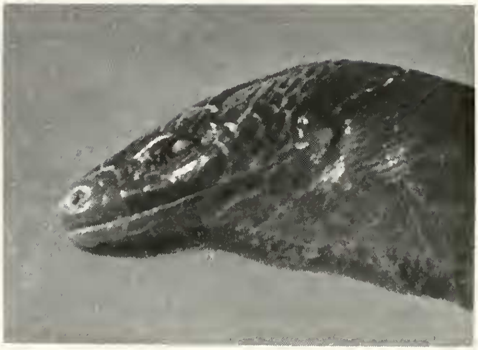
Oligolepis. In contrast to the preceding three species, *oligolepis* is in every way a perfect candidate for the closest living relative of *microtympanus* and *anotus*. The palate of *oligolepis* is very similar to that of *microtympanus* and presumably also to that of *anotus;* all three species are similar in size and body proportions, and there is no significant difference in the general details of squamation. *Oligolepis* differs markedly from *microtympanus* and *anotus* only in having a well-defined external ear opening and ear canal at the bottom of which is a translucent tympanum (Fig. 5), but since this kind of ear was undoubtedly primitive for the *microtympanus*→ *anotus* line, it simply serves to make *oligolepis* the closest living species, morphologically, to the ancestor of that line: *oligolepis*→ *microtympanus*→ *anotus*.

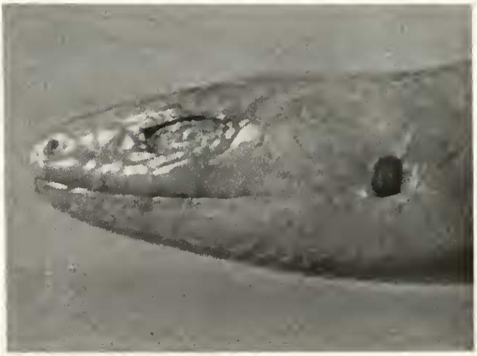
Comments on the Loss of the External Ear in Lygosomines

With the desecription of *Sphenomorphus anotus*, the total number of known "earless" lygosomines comes to 33. This is about 5 percent of the total number of known species in the subfamily.[1]

Taking a very conservative view of the species relationships, I believe that these 33 species represent no fewer than ten different lineages. Or, to put it another way, the external ear has been lost at least ten different times in the evolutionary history

[1]This percentage is very low compared to the other three subfamilies of skinks. All of the feylinines (4 species) and acontines (15 species) lack an external ear opening and just under 25 percent of the scincines, of which there are a total of approximately 182, are also "earless."





of the living lygosomines. The species in these ten groups, along with their distributions and other pertinent data, are listed in Table 2.

Unfortunately, it is difficult to say anything very conclusive about why the skinks in these different groups have lost the external ear, but I can make a few comments and suggestions for further research along these lines.

First, there is probably no one unifying reason for the loss of the external ear in all ten groups since there is nothing in the biology of these skinks beside the absence of an external ear that sets them apart from other lygosomines. It is true that all the earless species are in some sense cryptic in their habits but this is the rule rather than the exception for skinks.

Second, the only outstanding ecological feature of any of the species in the list of earless lygosomines is that certain of the species, *i.e., Isopachys,* most of the *australis* group and perhaps the *sumatrense* group, appear to be the most confirmed burrowers among lygosomines. This fact indicates that the absence of the external ear is probably a prerequisite for an in-depth evolutionary commitment to burrowing life, but there is no way of knowing whether the loss of the external ear in these skinks was achieved as a primary adaptation to burrowing life or whether it was a preadaptation, *i.e.,* originally evolved for other reasons in nonburrowing ancestors. The large number of earless lygosomines that show no exceptional proclivity to a burrowing life, *e.g.,* the *quadrivitattum* group, *Anotis mariae,* and *Ablepharus grayanus,* would argue that the loss of the external ear could be as much a preadaptation to burrowing life as it is a primary adaptation.

Third, Minton (1966) has suggested that, along with the ablepharine eye, the absence of an external ear opening in *Ablepharus grayanus* is a protective adaptation that allows this species to feed unmolested on the ants that are said to form much of its diet. This is an interesting idea, but to be convincing, it will have to be shown more rigorously than it can now be shown that *A. grayanus* is more of an ant specialist

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Figure 5. Lateral view of the head of *Sphenomorphus microtympanus* (top; paratype: MCZ 132767), *S. oligolepis* (middle; syntype: BMNH 1946.8.3.47), and *S. solomonis* (bottom; syntype: BMNH 1946.8.34–37). Note the relatively small external ear opening and small tympanum of *S. microtympanus* compared to its close relative *S. oligolepis* and its more distant species group relative *S. solomonis.*

TABLE 2. The 33 species of "earless" lygosomine skinks arranged in the smallest plausible number of monophyletic groups, along with notes on their distribution, relationships, and ecology. Generic names have been omitted for those groups for which the systematics are so poorly known that the use of a generic name is almost pointless. To identify these species I have given the author and date of the original description.

Species	Distribution	Relationships	Ecology Notes
Isopachys (*roulei*, *anguinoides*, and *gyldenstolpei*)	Thailand	Unknown	Totally limbless; found underground and known to burrow with ease (Taylor, 1963).
australis Peters 1873	C and SE Queensland	Perhaps derived from the *fasciatus* species group of *Sphenomorphus*	*Australis* and *frontalis* only other limbless lygosomines besides *Isopachys*; *truncatus* — burrowing in damp areas (Arnold, 1966), under logs in rain forest (Copland, 1952); *verreauxi* — burrowing in damp soil, and under logs (Arnold, 1966); *scutirostrum* — partly buried in humus under logs (Longman, 1916); *equalis* — under logs (Bustard, 1964).
frontalis De Vis 1888	NE Queensland		
truncatum Peters 1876	SE Queensland and NE New South Wales		
lentiginosus De Vis 1888	C and SE Queensland and N New South Wales		
verreauxi Duméril 1851	C and SE Queensland and N New South Wales		
reticulatus Günther 1873b	SE Queensland and NE New South Wales		
equalis Gray 1825	SE Queensland and N New South Wales		
scutirostrum Peters 1873	SE Queensland		
sumatrense Günther 1873b	Sumatra	Unknown	Unknown but attenuated body and greatly reduced limbs and digits suggest burrowing habits.
larutense Blgr. 1900a	Malaya		
miodactylum Blgr. 1903	Malaya		
trifasciatum Tweedie 1910	Malaya		
Hemiergis (*initiale*, *peroni*, *tridactylum*, *decresiense*, and *quadrilineatum*)	Southern parts of Australia	Perhaps derived from the *fasciatus* species group of *Sphenomorphus*	Burrowers in litter and loose soil.

TABLE 2 — continued

Sphenomorphus anotus	New Guinea	Member of the *fasciatus* species group of *Sphenomorphus*	Burrower in forest litter.
quadrivittatum Peters 1867 *infralineolatum* Günther 1873a *subvittatum* Günther 1873a *relictum* Vinciguerra 1892	Philippines; Sula Is., Palawan, Borneo Celebes and adjacent islands Philippines; Celebes Java and islands off W coast of Sumatra	Closely related to the light and dark striped "*Leiolopisma*" of the western Pacific area	Arboreal but cryptic; *quadrivittatum* and *subvittatum* have been found in the root tangles of aerial ferns.
surdum Blgr. 1900b[1] *cophias* Blgr. 1908 *palawanensis* Brown and Alcala 1961 *poilani* Bourret 1937 *tridigitum* Bourret 1939[2] *sanana* Kopstein 1926	Malaya Malaya Palawan I. C Vietnam C Vietnam Sula Is.	Unknown, but perhaps close to the small *Sphenomorphus* of the western Pacific area	Cryptic; *surdum* from roots of epiphytic plant and from beneath dead fiber on ground; *palawanensis* from beneath a rotting log in forest; *sanana* from beneath stones.
Anotis mariae	New Caledonia	Two other *Anotis* also on New Caledonia	Cryptic; found under rocks in forest.
Ablepharus grayanus	Tadzhikistan (USSR), E Iran, Afghanistan and Pakistan	Other *Ablepharus* of eastern Europe and SW Asia	Terrestrial and secretive; found under cover.

[1]Of all the groups in this table this group is the least likely to be monophyletic. In fact, it is very possible that none of the skinks in this group are very closely related.

[2]Bourret's (1939) figure of this species shows what appears to be a minute external ear opening, but on the basis of his statement "absence de tympan" in the type description, I have included it among the earless lygosomines.

than its close relatives that have external ear openings. I know of only one careful study on the feeding habits of an earless lygosomine (Smyth, 1968, on *Hemiergis peroni*), and this species showed no special fondness for ants or any other small insects that might pose a serious threat to an exposed tympanic membrane.

The most profitable next step in the study of the evolution of earlessness in lygosomines would be to take a group of earless lygosomines that are known to have close relatives with external ears and make detailed ecological comparisons between the two groups. The three best groups for this kind of study now are 1) the *quadrivitattum* group and its close relatives — the sharply light and dark striped skinks in the genus *Leiolopisma* of southeast Asia, the Philippines, the Indo-Australian archipelago, the Palaus and the New Guinea area; 2) *Ablepharus grayanus* and its congeners in eastern Europe and southwestern Asia, and, perhaps somewhat impractically because of the distribution, 3) *Anotis mariae* and its two congeners on New Caledonia.

Observations on *Sphenomorphus forbesi*, *S. oligolepis* and *S. schultzei*

Sphenomorphus forbesi Blgr. 1888 and *S. oligolepis* Blgr. 1914

In spite of the fact that *S. forbesi* and *S. oligolepis* have an osteological difference in the palate (see pages 9, 10) that serves to separate them rather distantly in terms of relationship, the two species are extremely similar in their external morphology. They are so similar, in fact, that Miss A. G. C. Grandison of the British Museum and I both agreed, after an initial examination of the type specimens, that the two forms were conspecific. It was only after a second and more detailed look with more specimens that I was finally convinced that the two forms are good species. It was not, however, until after I had decided that the two forms were good species on the basis of external morphology that I discovered the confirming osteological difference in the palate. Thus the two species can be distinguished without resorting to the sometimes rather destructive process of opening the mouth in preserved specimens and examining the palate. Because the two species are so similar externally they are reviewed here together.

Sphenomorphus forbesi was described by Boulenger (1888) from a single specimen collected at Sogere (= Sogeri) by H. O. Forbes at an elevation of 1750 feet on his expedition into the

Owen Stanley Range behind Port Moresby. The only other specimen to be reported since the original description is a single specimen from Bara Bara, Milne Bay, collected by L. Loria (Boulenger, 1897).

Sphenomorphus oligolepis, also described by Boulenger (1914), was based on two specimens from the Mimika River collected on the British Ornithologists' Union Expedition, and the only new locality information published on this species since its original description has been de Rooij's (1915) listing of a specimen from the Lorentz River.

Both *forbesi* and *oligolepis* are very similar to each other in terms of general squamation and color pattern, but they can be distinguished from each other in terms of size, small details of squamation and subtle differences in color pattern. These differences have been worked out from an examination of the following specimens: the type of *forbesi* (BMNH 1946.8.3.13); ten topotypic or nearly topotypic *forbesi* (MCZ 118845–47, 118851–53: Sogeri, 2000 feet; MCZ 118848–50: Sogeri road, 2 miles east of Rouna Falls, 1500 feet; American Museum of Natural History 103602: Sogeri, 460 meters); and three specimens that appear to be *forbesi* on comparison with the type (MCZ 13357–58; AMNH 105626: Wipim) one syntype of *oligolepis* (BMNH 1946.8.3.47); and 25 specimens which I identify as *oligolepis* after comparing them with the syntype (MCZ 118857: Soliabeda, 1800 feet; MCZ 109330–47; 118854–56: Oroi; 130716: Matkomrae; MCZ 130717: Mendua, and MCZ 130718: Bikim, 500 feet).

The significant differences between the two species are as follows:

Size. Forbesi is a smaller species than *oligolepis;* the largest *oligolepis* I examined (including the syntype) measured 55 mm in snout–vent length, whereas the largest *forbesi* I examined measured only 44 mm.

Squamation. In *forbesi* the fourth supralabial is centered beneath the eye (in all 28 cases provided by the 14 specimens) whereas in *oligolepis* it is the fifth supralabial that is more usually centered beneath the eye (the fifth in 43 out of 52 cases and the fourth in 9 out of 52 cases).

In *forbesi* the first infralabial is only about 1/2 to 2/3 the size of the second infralabial, whereas in *oligolepis* the first and second infralabials are about the same size.

Color. In preservative *forbesi* is generally golden brown to light brown above with small dark blotches and vermiculations;

Figure 6. Lateral view of the holotype of *Sphenomorphus forbesi* (top; BMNH 1946.8.3.13; snout-vent length = 40 mm) from Sogeri and *S. oligolepis* (bottom; BMNH 1946.8.3.47; snout-vent length = 55 mm) from the Mimika River. Note that the dark longitudinal lateral lines contrast with the dark color of the dorsum in *forbesi* but not in *oligolepis*.

oligolepis, on the other hand, is a more uniform and darker brown above and lacks the contrasting darker blotches or vermiculations. In both *forbesi* and *oligolepis* pigment tends to concentrate in longitudinal lines running between the lateral scale rows, and in *forbesi* these longitudinal lines stand out because the pigment is generally darker than the general ground color of the back, whereas in *oligolepis* the longitudinal lines do not stand out because the pigment is no darker than the dorsal ground color (Fig. 6).

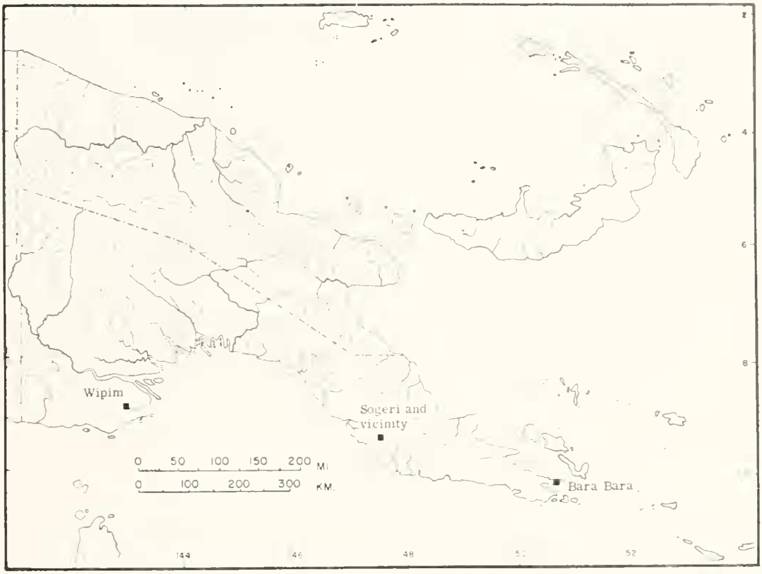

Figure 7. Map of eastern New Guinea showing the known localities for *Sphenomorphus forbesi.*

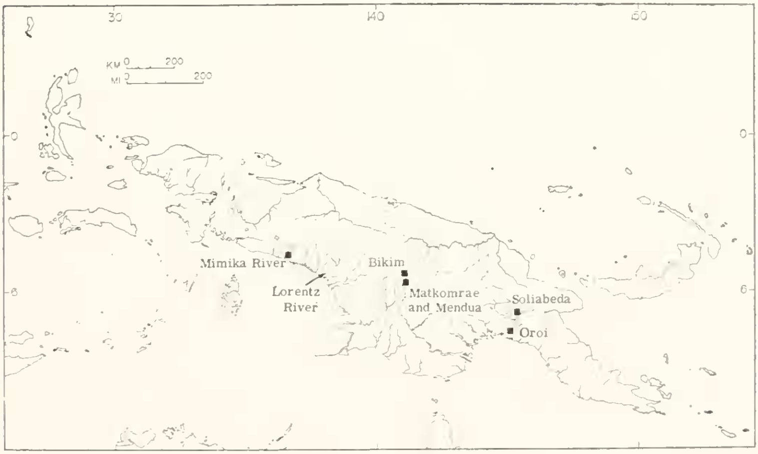

Figure 8. Map of New Guinea showing the known localities for *Sphenomorphus oligolepis.*

Two of the MCZ *forbesi* which I examined were gravid. One specimen with a snout–vent length of 40 mm contained a single thin-shelled egg in the right oviduct and the other specimen, which measured 43 mm in snout–vent length, contained two thin-shelled eggs, one in the right oviduct and one in the left. To judge from the texture of the egg shells in both specimens, it is likely that the species is oviparous.

Five of the MCZ *oligolepis* were gravid: four with a thinly shelled egg in the right and left oviduct and the fifth with a single large ovum in each ovary. It would thus appear that *oligolepis* is oviparous. The smallest of these gravid females had a snout–vent length of 43 mm and the largest had a snout–vent length of 53 mm.

The known distribution of *forbesi* and *oligolepis* is shown in Figures 7 and 8 respectively.

Sphenomorphus schultzei Vogt 1911

The two types of *Sphenomorphus schultzei* (Berlin 22135) were examined because the species seems to be a member of the *fasciatus* species group and within this group it combines a moderate to low midbody scale count with a low fourth toe subdigital lamellae count (Table 1).

Theodore Vogt (1911) described this species on the basis of two specimens captured by Leonard Schultze on an unnamed mountain at an elevation of 1570 meters in the region of the Sepik River below 5° latitude. Four years later de Rooij (1915) listed the Sermowai River as an additional locality for the species, but beyond this no new records have been published for the species.

In examining Vogt's two syntypes (Fig. 9) I immediately discovered that the first supralabial and nasal scale are fused into a single scale. That this fusion is not an anomaly is proved by the fact that it exists in the 11 *schultzei* from four different localities which have recently been added to the MCZ collections through the efforts of Fred Parker (MCZ 89897–99: Bomai, Tive Plateau, 3500 ft.; MCZ 124037–40: Tifalmin, 4300 ft.; MCZ 124041–43: Wangbin, 4800 ft.; MCZ 124044: Imigabin, 4200 ft.). These and other known localities are shown in Figure 10.

Apparently neither Vogt nor de Rooij noticed the scale fusion for neither author mentions it. There is a crease between the two scales that may have been mistaken for a suture with early optical equipment, but with good light and modern optics there is no doubting that the scales are fused.

Figure 9. Lateral view of a syntype of *Sphenomorphus schultzei* (Berlin 22135; snout-vent length = 34 mm) from the region of the upper Sepik River.

To my knowledge no other lygosomine skinks have a fused first supralabial and nasal scale, and thus this character provides a blessedly certain method of identifying at least one species of a notoriously difficult "generic" assemblage of lygosomines.

Variation in the taxonomically important characters of the 13 *schultzei* that I have examined (12 intact and one decapitated) may be summarized as follows: The two types have 20 midbody scale rows, but the 11 MCZ specimens have from 22 to 26 midbody scale rows. The modal number for all 13 specimens is 24. The range in the number of subdigital lamellae on the fourth toe for all specimens is 8–13 (avg. = 10.9). The number of nuchal scales on the left and right side of the midline in the 12 intact specimens ranges from 0–0 to 3–2. In all but two of 12 intact specimens the prefrontals meet medially

Figure 10. Map of New Guinea showing the known localities for *Sphenomorphus schultzei.*

and form a broad suture; in the remaining two specimens the right prefrontal is lacking in one and the prefrontals are separated in the other. In all 12 intact specimens the fourth supralabial is situated beneath the eye. The largest specimen measures 39 mm in snout–vent length.

In two of the MCZ specimens I found a single large, heavily shelled egg in the right oviduct. And in the only specimen of these two in which I looked for a left oviduct, I could find none, although there was a left ovary. It would appear, therefore, that the species is oviparous with a clutch size of one, and that it may lack a left oviduct.

Fred Parker has very kindly summarized his field notes on *schultzei* for me, and I have extracted the following information nearly *verbatim* from his notes. In the Bomai area (Fig. 10) *schultzei* is found in dense rain forest where it lives under decaying logs and vegetable matter on the forest floor in damp valleys. It is a fairly slow moving species. It is subject to rapid dehydration if not kept damp.

In life the iridescence of the scales almost conceals the color pattern. The dorsal surfaces are mottled pale and dark brown. There are some fine white specks on the lips and face. The flanks are brown with paler spots. The ventral surfaces are pale translucent yellow with some grey spots in the ventrolateral regions.

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